

Title: Nitrite metabolism in fetal and adult sheep blood.

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ABSTRACT BODY:

Background: Nitrite in blood is derived primarily from oxidation of nitric oxide (NO). Nitrite can be reduced, by reaction with deoxyhemoglobin resulting in methemoglobin, back into NO resulting in vasodilation in hypoxic tissues. Because this reaction is dependent on hemoglobin allostery, we hypothesized that nitrite metabolism in fetal blood would vary from that of the adult.

Objective: The kinetic parameters of nitrite metabolism in fetal and adult blood were measured in vitro. The portion of nitrite metabolized by reaction with hemoglobin was determined by measurement of cumulative methemoglobin production.

Design/Methods: Nitrite (500 M initial concentration) was incubated in fetal or adult blood at body temperature, oxygen-hemoglobin saturations of 50%, and ph of 7.4. Changes in nitrite and methemoglobin concentrations were measured at predetermined timepoints over an 80-minute period. Nitrite was measured by collection of blood into nitrite stop solution followed by chemiluminescence assay.

Results: Fetal blood metabolized nitrite significantly faster than adult blood, with elimination half-lives of 3.7 0.5 and 7.9 0.3, respectively (p<0.01). Cumulative methemoglobin production did not differ between fetus and adult, although methemoglobin was cleared from fetal blood significantly faster than adult blood (p<0.01). 2-3 moles of nitrite disappeared for every mole of methemoglobin produced in both fetal and adult blood.

Conclusions: Fetal sheep blood metabolizes nitrite at a rate nearly twice that of the adult. In both fetal and adult blood, approximately two thirds of nitrite metabolism occurs by unknown reactions that do not produce methemoglobin.

